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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/647,219	08/26/2003	Takeshi Aizawa	4404-2	1908
23117	7590	10/01/2004	EXAMINER	
NIXON & VANDERHYE, PC 1100 N GLEBE ROAD 8TH FLOOR ARLINGTON, VA 22201-4714			LESLIE, MICHAEL S	
		ART UNIT	PAPER NUMBER	3745

DATE MAILED: 10/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)
	10/647,219	AIZAWA ET AL.
Examiner	Art Unit	
Michael Leslie	3745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) Responsive to communication(s) filed on \_\_\_\_.
- 2a) This action is FINAL.      2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) Claim(s) 1-5 is/are pending in the application.
  - 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_ is/are allowed.
- 6) Claim(s) 1-5 is/are rejected.
- 7) Claim(s) \_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 26 August 2003 is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    - a) All    b) Some \* c) None of:
    1. Certified copies of the priority documents have been received.
    2. Certified copies of the priority documents have been received in Application No. \_\_\_\_.
    3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_.
- 4) Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_.
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: \_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gale et al. in view of Ogawa et al.

Gale et al. teaches a piston (10) having a ring groove (14) in which at least the ring groove is made of steel and a piston ring made of cast iron. Gale et al. does not teach a specific embodiment of the piston ring including a hard coat film formed to at least an outer peripheral sliding surface of the piston ring. Ogawa et al. teaches a cast iron piston ring having a hard coat film formed to a sliding surface of the piston ring at least on an outer peripheral sliding surface of the piston ring. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Gale et al. by using a cast iron piston ring with a hard coat film formed to at least an outer peripheral sliding surface of the piston ring as taught by Ogawa et al. for the purpose of having a piston and piston ring combination for use in heavy duty internal combustion engines.

In further regard to claims 2-5, Gale et al., as modified above with respect to claim 1, further teaches that the piston ring is made of cast iron selected from the group consisting of flake graphite cast iron, spheroidal graphite cast iron, white cast iron, malleable cast iron, vermicular graphite cast iron and alloy cast iron, the piston ring has an elastic modulus ranging

from 130000 to 170000 Mpa, the hard coat film is an ion-plating film, and that the piston ring is subjected to a nitriding treatment.

Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ahlen.

Ahlen discloses a combination of a piston and piston ring having a piston (17) with a piston ring groove (13) in which at least the piston ring groove is made of steel, a piston ring (10) made of cast iron, and a hard coat film formed to at least an outer peripheral sliding surface of the piston ring. Wherein the cast iron for the piston ring is selected from the group consisting of flake graphite cast iron, spheroidal graphite cast iron, white cast iron, malleable cast iron, vermicular graphite cast iron and alloy cast iron, and the piston ring has an elastic modulus ranging from 130000 to 170000 Mpa. Ahlen does not teach that the piston moves reciprocally in a cylinder bore. The main focus of Ahlen is the sealing ring with exemplary emphasis directed to seals between relatively rotating parts for achieving a suitable seal between areas of great pressure difference. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Ahlen to move reciprocally in a cylinder bore for the purpose of dividing areas of great pressure difference.

#### *Prior Art*

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patents 5258930, 3661402, and 3575433 each disclose cast iron piston rings with hard coatings, and U.S. Patents 5241748, 4679493 and 4233490 each disclose pistons with steel piston ring grooves.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Leslie whose telephone number is (703) 305-0055. The examiner can normally be reached on M-F 8:00am - 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Look can be reached on (703) 308-1044. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ML  
September 29, 2004

  
Michael Leslie  
Patent Examiner  
AU 3745

  
EDWARD K. LOOK  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 3700

9/30/04